



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/581,916

06/07/2006

Hiroyuki Eguchi

062520

1487

38834 7590 10/03/2007
WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER

BEHM, HARRY RAYMOND

ART UNIT

PAPER NUMBER

2838

MAIL DATE

DELIVERY MODE

10/03/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/581,916

Applicant(s)

EGUCHI ET AL.

Examiner

Harry Behm

Art Unit

2838

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 19 September 2007.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3 and 5 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-3 and 5 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☒ The drawing(s) filed on 07 June 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☒ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 9/19/07, with respect to claims 1 and 2 have been fully considered but they are not persuasive.

Applicant argues Scheel does not disclose any correction or adjustment of the resonant current. However, Figure 3 shows a variable on time adjusted to produce an output voltage such that the resonant current I_{res} is nearly equal.

Applicant further argues that Scheel fails to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., the LC resonant circuit is located on the secondary side of the transformer) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Applicant's arguments with respect to amended claims 3 and 5 have been considered but are moot in view of the new ground(s) of rejection.

Drawings

Examiner incorrectly indicated Figure 1 should be designated as Prior Art, instead Figure 4 should be designated as Prior Art.

Figure 4 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled

Art Unit: 2838

"Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the LC resonant circuit in series with the primary side winding, as in Claim 1, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner,

Art Unit: 2838

the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

The specification received 9/19/07 is accepted.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2 rejected under 35 U.S.C. 102(b) as being anticipated by Scheel (US 6,351,401).

With respect to Claim 1, Scheel discloses a DC-DC converter comprising: a transformer (Fig. 1 9) having primary [input] side terminals, secondary [output] side terminals, a primary side winding, and a secondary side winding and determining a voltage converting ratio $[N_s/N_p]$; a pair of switching means (Fig. 1 3,4 and 5,6) which is interposed between said primary side terminals and said primary side winding, a LC resonant circuit (Fig. 1 LC) comprised of a resonating reactor (Fig. 1 L) connected in series with said primary side winding (Fig. 1 9 input side) of the transformer, and a

Art Unit: 2838

resonating capacitor (Fig. 1 C) that resonates with said resonating reactor; and a driving means (Fig. 1 8) for alternately turning said pair of switching means ON/OFF, wherein: a resonant current detecting means (Fig. 1 12) for detecting a resonant current (Fig. 1 $i_{res}(t)$) caused by an operation of said LC resonant circuit and means for feeding a detected output (Fig. 1 $u_c(t)$) of said resonant current detecting means back to said driving means are provided; and said driving means drives (Fig. 1 a,b,c,d) said pair of switching means by correcting their on-state lapses of time so that their on-state resonant currents may be nearly equal to each other (Fig. 3 $i_{res}(t)$) based on the detected output of said resonant current detecting means.

With respect to Claim 2, Scheel discloses the DC-DC converter according to claim 1, wherein said resonant current detecting means (Fig. 1 12) is provided on the primary side of said transformer.

Claims 3 and 5 rejected under 35 U.S.C. 102(e) as being anticipated by Jang (US 5,057,698).

With respect to Claim 3, Jang discloses a bi-directional DC-DC converter comprising: a transformer (Fig. 5 TR) having low-voltage side terminals [primary], high-voltage side terminals [secondary], a low-voltage side winding (Fig. 5 N_p), and a high-voltage side winding (Fig. 5 N_s) and determining a voltage converting ratio (Fig. 5 n); a low-voltage side pair of switching means (Fig. 5 SH,SL) interposed between said low-voltage side terminals and said low-voltage side winding; a high-voltage side pair of switching means (Fig. 5 S1,S2) interposed between said high-voltage side terminals

Art Unit: 2838

and said high-voltage side winding; a low-voltage side rectifying element [antiparallel diode] connected in parallel with each of switching elements in said low-voltage side pair of switching means; a high-voltage side rectifying element [anti-parallel diode] connected in parallel with each of switching elements in said high-voltage side pair of switching means; and a driving means (Fig. 4 Primary-Current Feedback Frequency Control, PWM Output Voltage Feedback Control) for turning ON/OFF the switching elements in said low-voltage side pair of switching means and the switching elements in said high-voltage side pair of switching means, wherein: a LC resonant circuit (Fig. 5 Ls,Cs) is interposed between said high-voltage side winding and said high-voltage side pair of switching means; a resonant current detecting means (Fig. 4 primary and secondary current sense) for detecting a resonant current caused by an operation of said LC resonant circuit and means for feeding a detected output of said resonant current detecting means back to said driving means are provided; and said driving means drives said low-voltage side pair of switching means or said high-voltage side pair of switching means by correcting their on-state lapses of time so that their on-state resonant currents may be nearly equal to each other based on the detected output of said resonant current detecting means (Fig. 7 f shows the driving means adjusts the current to be nearly equal).

With respect to Claim 5, Jang discloses the DC-DC converter according to claim 3, wherein said low-voltage side pair of switching means and said high-voltage pair of switching means are each configured by interconnecting four switching elements (Fig. 5 SH,SL,D1,D2) in a bridge (Fig. 5 SH,SL,S1,S2,D1,D2).

Claims 1-3 and 5 rejected under 35 U.S.C. 102(e) as being anticipated by Eguchi (US 2007/0041222).

With respect to Claims 1-3 and 5, Eguchi discloses a DC-DC converter in Fig. 2, where the item matching follows by inspection of Figure 2, and the frequency detecting circuit 6 is disclosed as a resonant current detecting current transformer.

Priority

Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Applicant cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3 and 5 rejected under 35 U.S.C. 103(a) as being unpatentable over Widener (US 5,057,698) in view of Zhang (US 6,262,905).

With respect to Claim 3, Widener discloses a bi-directional DC-DC converter comprising: a transformer (Fig. 2 16) having low-voltage side terminals [primary], high-voltage side terminals [secondary], a low-voltage side winding (Fig. 2 65), and a high-

Art Unit: 2838

voltage side winding (Fig. 2 60) and determining a voltage converting ratio; a low-voltage side pair of switching means (Fig. 2 42,44 or 46,48) interposed between said low-voltage side terminals and said low-voltage side winding; a high-voltage side pair of diodes interposed between said high-voltage side terminals and said high-voltage side winding; a low-voltage side rectifying element [antiparallel diode 49] connected in parallel with each of switching elements in said low-voltage side pair of switching means; a high-voltage side rectifying element [diode 18]; and a driving means (Fig. 2 28) for turning ON/OFF the switching elements in said low-voltage side pair of switching means, wherein: a LC resonant circuit (Fig. 2 Ls,Cs) is interposed between said high-voltage side winding and said high-voltage side pair of diodes; a resonant current detecting means (Fig. 2 Ir sense) for detecting a resonant current caused by an operation of said LC resonant circuit and means for feeding a detected output of said resonant current detecting means back to said driving means are provided; and said driving means drives said low-voltage side pair of switching means by correcting their on-state lapses of time so that their on-state resonant currents may be nearly equal to each other based on the detected output of said resonant current detecting means [switching adjusts the sinusoidal current which is nearly equal].

Widener does not disclose a high-voltage side pair of switching means interposed between said high-voltage side terminals and said high-voltage side winding. Zhang teaches using a synchronous rectifier (Fig. 2 AC Switch) instead of diodes for the secondary rectification. It would have been obvious to one of ordinary skill in the art at the time of the invention to use synchronous rectifying switches instead of diodes. The

Art Unit: 2838

reason for doing so is to reduce the power loss in the diodes by using the lower on resistance of a switch.

With respect to Claim 5, Widener in view of Zhang discloses the DC-DC converter according to claim 3, wherein said low-voltage side pair of switching means (Fig. 2 28) and said high-voltage pair of switching means [synchronous rectifier controller] are each configured by interconnecting four switching elements in a bridge [both are bridges].

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-3 and 5 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-3 and 5 of copending Application No. 10/579468. Although the conflicting claims are not identical,

Art Unit: 2838

they are not patentably distinct from each other because it would have been obvious to one of ordinary skill in the art at the time of the invention to use a frequency detecting unit, disclosed as a resonant current detecting current transformer, as a resonant current detecting means for adjusting the resonant current to be symmetric and nearly equal.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Duerbaum (US 6,711,034) discloses a resonant converter with current sensing in the primary.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry Behm whose telephone number is 571-272-8929. The examiner can normally be reached on Business EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Karl Easthom can be reached on 571-272-1989. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



KARL EASTHOM
SUPERVISORY PATENT EXAMINER